Graduate Diploma

Level 7

(Information Technology Strand)

STD513 Database

NQF Level 5, 10 credits

Project

(Worth 50% of final Mark)

(50 Marks)

Instructions and guidelines for the project:

1. Submission date and time: _____.

2. The completed project must be handed to the lecturer at the beginning of the class on the due date.

3. Submit a print and bonded copy of your report along with the electronic copy of all work. The lecturer will inform you how to submit the soft copy.

4. ***Warning: All media must be virus free!*** Media containing virus or media that cannot be run directly will result in a FAIL grade.

5. You must read and understand Ntec's policy on 'Academic Dishonesty and Plagiarism'.

Projects completed using unfair means or plagiarised will receive a FAIL grade.

6. The report must have a title page with your name, class and id number clearly printed.

7. Start working on the project as soon as it has been handed out in the class. Working on the project right from day one will ensure that it is completed on time.

8. Work through each task, making copies of the source codes, diagrams and output produced as you complete them as they will be required as part of your submission.

9. Use the right naming and indentation style. Use comments to document each procedure, table and query.

10. Projects will be judged on the basis of completeness, correctness and clearness.

Introduction to the project:

The aim of this project is to allow you to demonstrate an understanding of the data base design and analysis. The following are the objectives that this you will have to meet based on the given tasks:

1- Analyse the description of an information system to create a data model representing the information system.(Learning Outcome 1)

2- Design and develop a working database which confirms understanding of database development issues.(Learning Outcome 2)

Project Description

Your project will be a small database system developed using SQL. You are required to use all the knowledge acquired throughout this course.

Task 1 – Project Scope (5 Marks)

It is important that you pick your project carefully, as you will be working on it throughout the term. It is much easier and fun to work on a project that is interesting and meaningful to you.

Each student has to select one of the projects provided at the end of this document. Students are also encouraged to work on other projects they would propose but they need first to write a short description like the one given at the end of document and seek the lecturer approval.

Write an introduction (1-2 page) that concludes the project idea, its main functionality, the goal and objectives of the project.

Task 2 – Project Design (10 Marks)

Once your project proposal has been approved by your lecturer you can move on to design your project and develop the database system. In your design you should:

1) Describe the Data model using ER Diagram.
2) Apply your model at each stage of normalisation.
3) Develop a database schema for DBMS of your choice
4) List all the tables, relationships and constrains
5) List all the procedures and triggers
6) List at least three different reports

Task 3 – Project Implementation (20 Marks)

In this task you need to write the SQL code to implement your design. Make sure to meet the database design and implementation principles such as:

- Creating tables for the proposed schema
- Creating indices for each table
- Using different relationships for the related tables
- Declaration, assignments, control statement, and exception in SQL language.
- Using different single table and multi-table queries

Task 4 – Project Testing (5 Marks)

Perform database testing to test the main functionality of your database and document the testing results. The database testing should include testing the data integrity, data accessing, query retrieving, modifications, updating and deletion.

Task 5: Documentation and Final Submission (10 Marks)

You are required to submit a report that include the following items:

1. Introduction
2. ERD Diagram and other supported design documents
3. SQL code
4. Output Reports
5. Testing result

Sample Projects Ideas

Project 1

A university database contains information about professors (identified by social security number, or SSN) and courses (identified by course id). Professors teach courses; each of the following situations concerns the Teaches relationship set.

- Professors can teach the same course in several semesters, and each offering must be recorded.
- Professors can teach the same course in several semesters, and only the most recent such offering needs to be recorded. (Assume this condition applies in all subsequent questions.)
- Every professor must teach same course.
- Every professor teaches exactly one course (no more, no less).
- Every professor teaches exactly one course (no more, no less), and every course must be taught by a professor.
- Now suppose that certain courses can be taught by a team of professors jointly, but it is possible that no one professor in a team can teach the course. Model this situation, introducing additional entity sets and relationship sets if necessary.

Project 2

Considering the following information about university database:

- Professors have an SSN, a name, an age, a rank, and a research specialty.
- Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget.
- Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.).
- Each project is managed by one professor (known as the project's principal investigator).
- Each project is worked on by one or more professors (known as the project's co-investigators).
- Professors can manage and/or work on multiple projects.
- Each project is worked on by one or more graduate student (known as the project's research assistants).
- When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one.
- Departments have a department number, a department name, and a main office.
- Departments have a professor (known as the chairman) who runs the department.
- Professor works in one or more department, and for each department that they work in, a time percentage is associated with their job.
- Graduate students have one major department in which they are working on their degree.
- Each graduate student has another, more senior, graduate student (known as a student advisor) who advises him or her on what courses to take.

Project 3:

Notown Records has decided to store information about musicians who perform on its albums (as well as other company data) in a database. The company has wisely chosen to hire you as a database designer (at your usual consulting fee of $2,500/day).

- Each musician that records at Notown has an SSN, a name, an address, and a phone number. Poorly paid musicians often share the same address, and no address has more than one phone.

- Each instrument that is used in songs recorded at Notown has a name (e.g., guitar, synthesizer, flute) and a musical key (e.g., C, B-flat, E-flat).
- Each album that is recorded on the Notown label has a title, a copyright date, a format (e.g., CD or MC), and an album identifier. Each song recorded at Notown has a title and an author.
- Each musician may play several instruments, and a given instrument may be played by several musicians.
- Each album has a number of songs on it, but no song may appear on more than one album.
- Each song is performed by one or more musicians, and a musician may perform a number of songs.
- Each album has exactly one musician who acts as its producer. A musician may produce several albums, of course.

Project 4:

Computer Sciences Department frequent fliers have been complaining to Dane County Airport officials about the poor organisation at the airport. As a result, the officials have decided that all information related to the airport should be organised using a DBMS, and you've been hired to design the database. Your first task is to organise the information about all the airplanes that are stationed and maintained at the airport. The relevant information is as follows:

- Every airplane has a registration number, and each airplane is of a specific model.
- The airport accommodates a number of airplane models, and each model is identified by a model number (e.g., DC-10) and has a capacity and a weight.
- A number of technicians work at the airport. You need to store the name, SSN, address, phone number, and salary of each technician.
- Each technician is an expert on one or more plane model(s), and his or her expertise may overlap with that of other technicians. This information about technicians must also be recorded.
- Traffic controllers must have an annual medical examination. For each traffic controller, you must store the date of the most recent exam.
- All airport employees (including technicians) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identified by the social security number.
- The airport has a number of tests that are used periodically to ensure that airplanes are still airworthy. Each test has a Federal Aviation Administration (FAA) test number, a name, and a maximum possible score.

- The FAA requires the airport to keep track of each time that a given airplane is tested by a given technician using a given test. For each testing event, the information needed is the date, the number of hours the technician spent doing the test, and the score that the airplane received on the test.

Project 5:

The Prescriptions-R-X chain of pharmacies has offered to give you a free lifetime supply of medicines if you design its database. Given the rising cost of health care, you agree. Here's the information that you gather:

- Patients are identified by an SSN, and their names, addresses, and ages must be recorded.
- Doctors are identified by an SSN. For each doctor, the name, specialty, and years of experience must be recorded.
- Each pharmaceutical company is identified by name and has a phone number.
- For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.
- Each pharmacy has a name, address, and phone number. Every patient has a primary physician.
  - Every doctor has at least one patient. Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.
  - Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each prescription has a date and a quantity associated with it. You can assume that if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.
  - Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several pharmaceutical companies. For each contract, you have to store a start date, an end date, and the text of the contract.
  - Pharmacies appoint a supervisor for each contract. There must always be a super-visor for each contract, but the contract supervisor can change over the lifetime of the contract.

Project Marking Guide

Marking Criteria	Designed Marks	Awarded Mark	Comment(s):
Task 1: Scope			
Introduction (1-2 page) that concludes the project idea, its main functionality, the goal and objectives of project.	5		
Total of Task 1>>	**5**		
Task 2: Design			
ERD Diagram is created	2		
The model is applied for each stage of normalization	2		
List of tables, relationships and constrains	2		
List of procedures and triggers	2		
List at least three different reports	2		
Total of Task 2>>	**10**		
Task 3: Implementation			
Database schema principles used correctly, the right tables are created and used the right relationships, primary keys and foreign keys.	8		

Functionality All reports defined in the design are working correctly	4		
Documentation (good documentations used to document all parts of the implementation)	4		
System running and Output (Sufficient no. of scenarios are used to test the program)	4		
Total of Task 3>>	**20**		
Task 4: Testing			
Database testing done correctly	5		
Total of Task 4>>	**5**		
Task 5: Final Submission			
Introduction ERD Diagram and other supported design documents SQL code Output Reports Testing result	2 2 2 2 2		
Total of Task 5>>	**10**		
Total:	**50**		